TELIDON IN HEALTH CARE

A Report Prepared for the Information
Systems Division, Ontario Ministry of Health

by

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EXECUTIVE SUMMARY

The Information System Division, Ontario Ministry of Health commissioned this study in September 1981 following extensive media coverage of the new Canadian communications technology, Telidon. With the Canadian government's goal to encourage industry to create markets for Telidon, and the Ontario government's commitment to supporting the development of high technology industries such as Telidon hardware manufacturing, in Ontario, there is every indication that Telidon will be as widespread in the future as the telephone and television are today Inevitably such events will impact on the way health services are delivered and received. The purpose of this Report is to provide decision makers, potential Telidon users and technical personnel in the health care field with an overview of the technology and its possible application in health services delivery.

Telidon is the trade name of the Canadian Teletext and Videotex systems. These systems are intended to provide all sectors of society with inexpensive access to computer data banks. This is made possible through electronic devices that can adapt ordinary TV sets, and other similar receiving devices, to become, in reality, computer terminals. Teletext is one-way transmission of information from a data bank to a receiving station (TV set). Using hand held key pads owners of adapted TV receivers can select for viewing on their screens 'pages'of information as they wish. Videotex refers to an interactive service where the user is accessing a computer data bank. Experts in the field predict that Videotext will be more commercially viable in the future.

Following a review of private sector investment in Telidon this study reports on a series of interviews conducted with senior personnel at the Ontario Ministry of Health. The purpose of these interviews was to determine what potential applications for Telidon existed within the Ministry. These interviews identified possible application in continuing education and upgrading of health care personnel across the province, informing the public about health care, and possibly in influencing decision making

elements in the management of health services. The Report also discusses the relationship of Telidon to the Ministry's Telemedicine program and the cost implication of Telidon. In addition a brief overview is provided of the Telidon language (PDIs), the organization and management of Telidon data banks and a basic review of Telidon hardware characteristics and telecommunications.

In consideration of further action by the Ontario Ministry of Health in the introduction of Telidon technology to the health care industry it is recommended:

1. That the Ministry of Health act in collaboration with various interest groups, including the Ministry of Education, to develop Telidon pilot studies to evaluate the effectiveness of the technology for the continuing education and upgrading needs of health personnel across the province.

2. That the Ministry of Health in collaboration with professional associations and colleges, investigate further the extent to which Telidon technology can facilitate the continuing education and upgrading needs of health professionals.

3. That the Ministry of Health develop data banks on such topics as well baby visits, nutrition counselling, smoking cessation, birth control, etc. and assess the receptiveness of the public towards this information in such settings as doctors' offices, hospital ambulatory care units, public health units and Health Service Organizations (HSOs).

4. That the Ministry of Health sponsor a market survey to determine the financial viability of an Ontario Health Care Telidon data bank for commercial access by information receivers across North America.

5. That the Ministry of Health in collaboration with the Ministry of Community and Social Services assess further the practicalities of a community resource Telidon data bank which will provide information to the public about services that are locally available and how they should be accessed.

6. That the Ministry of Health in collaboration with the Ministry of Community and Social Services assess the extent to which Telidon technology can be used as a means of two-way communication with the elderly and the disabled who live alone.

7. That the Ministry of Health establish pilot studies to evaluate the advantages of Telidon between such combinations as:

   consumer/professional
   professional/professional
   professional/hospital
   hospital/hospital
   health care outlet/Ministry of Health

8. That the Ministry of Health establish a pilot study to evaluate the advantages of Telidon or similar technology, to provide a central bed registry for geographically related hospitals and ambulance dispatch centres.

9. That the Ministry of Health assess what implications Telidon may have for EDP systems, such as the Computer Assisted School Health (CASH) program, which it is currently responsible for administering.

10. That the Ministry of Health assess further the extent to which Telidon technology, relative to similar communications technology is suited to the updating of administrative, technical and clinical procedures which it mandates at central offices for dissemination to regional offices.

11. That the Ministry of Health assess further the extent to which Telidon technology can be made to interact with health care data banks to provide interpretation of statistical data graphically and in colour so that decision making elements within the health care system will be more receptive to the message being relayed.

12. That the Ministry of Health immediately investigate the application of all forms of modern telecommunications technology in order to establish an efficient and effective communications between itself, its agents and the providers of health services across the province, so that fiscal and legal accountability can reasonably and quickly be demonstrated and pertinent data captured.

FOREWORD

During the summer of 1981 there was considerable media coverage on the Canadian Communications technology known as Telidon. Also presentations by the Department of Communications of the Canadian government were introducing various audiences to some aspects of what was technically feasible with Telidon. These presentations often tended to leave those witnessing them with more questions than answers. However, the implications of having such technology widely distributed throughout society, as was being predicted, were becoming increasingly apparent to those concerned with providing and receiving information.

Health services delivery, as with most sectors of our modern society, is very much concerned with the transfer and interpretation of information between different parties. Recognizing the changes in communication that appear to be possible as a consequence of the advent of Telidon, and their probable impact in the health field, the Information Systems Division of the Ontario Ministry of Health commissioned this study in September 1981.

The primary purpose of this Report is to serve as an information document about the Telidon technology. Such a document appeared to be necessary as a basis for discussion about Telidon in health care by a broad representative group of decision makers, potential users and technical personnel. Secondarily, this Report will provide the basis for further discussion about the possible applications of Telidon in the Ontario health care system. In order to accomplish these goals the following objectives were identified at the outset of this study.

1. To describe and explain how the Telidon technology functions.
2. To assess how the Telidon technology can be most effectively

used to improve health services delivery in Ontario.

3. To identify areas where the application of Telidon technology, or similar technology, could be applied so that there is improved efficiency in health services delivery in Ontario.
4. To assess the cost of using Telidon technology in health care in Ontario.
5. To make recommendations on the future involvement of the Ministry of Health in the exploitation of Telidon technology in health services delivery in Ontario.

The methodology for gathering data for this study consisted of a literature review and interviewing individuals who are, or who could be, involved in the application of Telidon in health services delivery. Being a new technology that is currently undergoing various pilot studies, the major portion of available literature consisted of commercial brochures put out by hardware manufacturers or journalistic articles about the impact Telidon (Videotex) will have on our lives in the future. The Communications Research Centre of the Department of Communications in December 1978 published the technical documents: Technical Note No. 697-E 'A General Description of Telidon: - A Canadian Proposal for Videotex Systems' and Technical Note No. 699-E 'Picture Description Instructions PDI for the Telidon Videotex System'. Presumably, as the various Telidon pilot studies are evaluated, more definitive information about its applications and limitations will become available.

Skeptics often describe Telidon as a solution looking for a problem. The optimists say that the potential uses to which Telidon technology can

be made to apply are limited only by our imaginations. Most persons who are familiar with the problems of providing health care, upon witnessing a demonstration of Telidon begin to imagine possible applications in the delivery of service. The realization that such technology will be as common as the telephone and television are today generally infers some application in the accessibility and availability to services and the continuity and quality of care. While this Report is intended to provide background information on Telidon it cannot replace the experiences of seeing how Telidon data banks are created and how such data banks are accessed via an ordinary TV set.

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GOVERNMENT INVOLVEMENT IN TELIDON

> "There are few nations on earth where communications are as crucial to survival of the individual, the community and the nation as Canada. As a result, Canada has been a world leader in developing the most advanced, most extensive and most adaptable communications networks. We have 63.3 telephones for every 100 people; three national and several television networks throughout the country; the world's first geostationery domestic satellite communications system; three trans-continental microwave networks; cable television available to 75 percent of Canadian homes; and more fibre optic cable in place than any other country."[1]

Telidon is a communications protocol that was developed at the Communications Research Centre, Department of Communications, Government of Canada. Telidon has the flexibility to dovetail into any of the networks referred to above and to be adaptable enough to work with any other form of communications technology. In the two year period since the first Telidon terminal was unveiled, Telidon systems have sprung up across Canada and around the world. Supported by such initiatives as the Canadian government's Industry Investment Stimulation Program, manufacturers are gearing up production lines to meet the anticipated high demand for the necessary equipment that will serve this new technology.

In February 1981, Canadian Communications Minister, the Hon. Francis Fox announced a $27.5 million increase in support for the Telidon program, over the next two years. Department officials estimate that the extra funds will lead to installation of 12,000 terminals by 1982. These extra funds

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[1] 'Telidon Today' A tabloid published by the Department of Communications Summer 1981

will be used for the following:

.. Purchase by government of 6,000 Telidon terminals in the next year to be loaned to industrial concerns for use in operating systems and trials, subject to their purchase of at least an equal number of terminals.

.. Product research and development to reduce the price and expand the capabilities of Telidon equipment. New equipment will include captioning decoders for the hearing impaired.

.. Support for important national and international Telidon systems, including a national broadcast Teletext service in both languages.

.. Support for public interest initiatives to permit disadvantaged groups, minorities and consumer organizations to exploit Telidon's potential.

Under the Department of Communications' Industrial Investment Stimulation Program (IISP), which was initially administered in the Fall of 1981, the Canadian government plans to distribute 6,000 Telidon terminals to eligible organizations for operational systems or market trials. This is subject to their purchase of at least an equal number of terminals and to the further exploitation of Telidon made in their proposal. While directly promoting the manufacture to Telidon equipment, the IISP is also intended to encourage Telidon data bank content creation, not only by reducing equipment costs, but especially by expanding to potential audiences. The extent to which all the 6,000 available terminals will be distributed during the Fall of 1981 is

difficult to determine at the time of writing this Report. Presumably the Department of Communications will be administering the IISP program at a later date if it has a number of Telidon terminals that were not allocated in the Fall of 1981.

The Ontario government's Report of the Board of Industrial Leadership and Development (BILD) 'Building Ontario in the 1980s' (January 1981) identifies as a primary economic goal the need for government to promote research and development, nurture high technology, and expand markets for Ontario products. This Report goes on to state that the Government of Ontario is prepared to accept equity risk positions in such new high technology as Telidon, in the expectation that these ventures in time will become commercially successful and self financing. The BILD Report also states that as part of its procurement policy, the Government of Ontario will use its purchasing power and its funding support for local governments, boards and agencies to promote the development of manufacturing in Canada, thereby stimulating such a technological innovation as Telidon.

The necessary devices for adapting television sets to use Telidon technology are available, and, are being manufactured in Ontario. (See Appendix 1) Acknowledging the Ontario government's commitment to the development of high technology industries in the province and the Canadian government's goal to encourage Canadian industry to create markets for using Telidon, there is every indication that such devices will achieve high penetration of the consumer market over the next five years.

TELETEXT AND VIDEOTEX TELIDON SYSTEMS

Telidon is the trade name of the Canadian Teletext and Videotex systems. Other nations active in the development of this technology are Britain with its Prestel and France with its Antiope. The International Telegraph and Telephone Consultative Committee recognizes the term 'Videotex' as being the generic name for all forms of this technology. The French and British systems are based on an alphanumeric format, which restricts the display of information to rigid format textual messages and rudimentary graphic mosaic images. The Canadian Telidon is based on computer graphic principles which can provide more applicable alpha-geometric images. Telidon has a colour palette of eight colours and six shades of grey to choose from, and its colour versatility is expected to be expanded further in the future.

Teletext and Videotex systems are intended to provide all sectors of society with inexpensive access to computer data banks. This is made possible through electronic devices that can adapt ordinary TV sets, and other similar receiving devices, to become, in reality, computer terminals.

Teletext is one-way transmission of information from a data bank to a receiving station (TV set). Using hand held key pads owners of adapted TV receivers can select for viewing on their screens 'pages' of information as they wish. Such systems can provide relevant information of mass audiences at modest cost. The likely possibility of this technology being developed by TV cable companies and other broadcast agencies in Canada will mean that subscribers to such agencies will be looking for data banks into which they can key-in for information. One such data bank could be concerned with matters relating to the maintenance and promotion of good health and the prevention of

disease and dysfunction. It is also conceivable that such information systems may be able to provide diagnoses and treatment protocols which viewers could monitor with the guidance of a family physician, a public health nurse or the health professional.

Videotex refers to an interactive service where the user is accessing a computer data bank. A Videotex system converts the home TV into a shopping plaza, a bank, a mailbox, a school or a chess or bridge partner. It is conceivable that this technology will have some impact on other institutions in our society such as the doctor's office, the hospital and the local public health unit and the pharmacy. Also there is the possibility that this type of communications technology will find a use between health care outlets across the province and between these outlets and various regional and provincial central agencies. For example, the health science centres, district health councils, public health units, ambulance dispatch centres, the Ministry of Health, the Ontario Health Insurance Plan (OHIP) and the Hospital Medical Records Institute (HMRI) could provide content for Telidon data banks. It is generally believed by experts in the field that Videotex will be more commercially viable than the straight forward information service provided through the Teletext system.

BUSINESS INTEREST IN TELIDON

The future use of Telidon technology is dependent on the availability of, and access to, appropriate types of data banks. The development and ownership of these data banks is a key factor in the further exploitation and commercialization of this technology.

In a presentation given at the 'New Developments in Canadian Communications Law and Policy' Conference in Ottawa, January 1980 Mr. John Madden, President of Microtel Pacific Research Limited, formerly of the Department of Communications, after giving an overview of Telidon asked the rhetorical question "Will it Sell?" He then goes on to give the following personal comments:

"a) The business terminal market for information systems, electronic mail and text processing systems is clearly here already and it has been variously estimated to grow to about $700,000,000 per annum by 1985 and $3 billion by 1995 in Canada alone. It remains an open question as to what fraction of that market could or should fall into Telidon related products. Since Telidon is essentially a communications protocol, amenable to use in a wide variety of terminals and systems including most office terminals equipment, the area of application could be large.

b) The home market is much more difficult to estimate, and is likely to be much more sensitive to price of the terminal electronics. Although it is easy to become so fixed on price that one forgets to worry about specifying whether one considers Telidon as strictly an information system or whether, and to what extent, it can be considered as an entertainment communications device. Presumably consumers will be willing to pay more for the device with expanded capability."

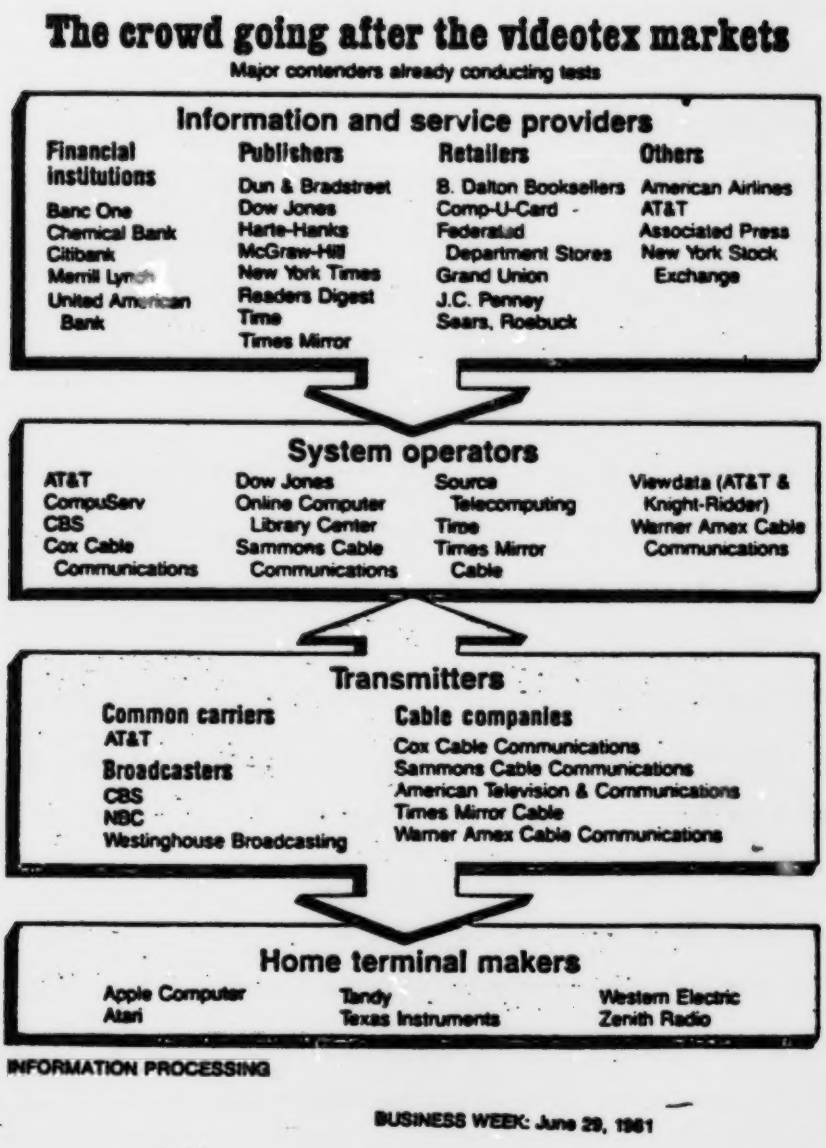
Noting that the industry is not so subject to economic swings because it offers tremendous gains in productivity, The Globe and Mail Report on Business of May 4 1981, an edition dedicated to the Office of the Future,

states that "The convergence of telecommunications, word and data processing into the integrated electronics office is expected to generate between $150 - 300 billion in sales of office automated equipment in North America by 1985." In the same edition, an article entitled "Videotex promises great change in Communication" quotes the Canadian Minister of Communications as saying "Market forecasts have estimated that one (million) to four million Videotex terminals could be installed in Canada this decade. That alone represents some $1 billion to Canada's electronic manufacturing industry." However, as a word of caution, the same article refers to a report on Videotex by Evans Research Corporation of Mississauga, Ontario, which states that the Telidon system would pass its full market trial by 1982. Until such data are available it is difficult to predict consumer acceptance of Telidon services.

The U. S. has been slow in entering the Videotex industry. However, there is now a rush to catch up with their foreign competitors. American companies are becoming very active in every aspect of the Videotex markets such as providing the information and services, running central computer systems, inter-connecting the customers, or selling the home terminals. The Business Week magazine of June 29 1981 published a six-page report entitled 'The Home Information Revolution' and extensively commented on how Videotex, a new industry in the making, expects to generate sales of $19 billion worth of Videotex equipment and pay $16 billion annually for these services by 1990 in the U. S. alone. (See figure 1)

The Canadian communications technology Telidon is proving to be compatible with other Canadian innovations in the computer field and hence

FIGURE 1


The crowd going after the videotex markets
Major contenders already conducting tests
Information and service providers
Financial institutions
Banc One
Chemical Bank
Citibank
Merrill Lynch
United American Bank
Publishers
Dun & Bradstreet
Dow Jones
Harte-Hanks
McGraw-Hill
New York Times
Readers Digest
Time
Times Mirror
Retailers
B. Dalton Booksellers
Comp-U-Card
Federated Department Stores
Grand Union
J.C. Penney
Sears, Roebuck
Others
American Airlines
AT&T
Associated Press
New York Stock Exchange
System operators
AT&T
CompuServ
CBS
Cox Cable Communications
Dow Jones
Online Computer Library Center
Sammons Cable Communications
Source Telecomputing
Time
Times Mirror Cable
Viewdata (AT&T & Knight-Ridder)
Warner Amex Cable Communications
Transmitters
Common carriers
AT&T
Broadcasters
CBS
NBC
Westinghouse Broadcasting
Cable companies
Cox Cable Communications
Sammons Cable Communications
American Television & Communications
Times Mirror Cable
Warner Amex Cable Communications
Home terminal makers
Apple Computer
Atari
Tandy
Texas Instruments
Western Electric
Zenith Radio
INFORMATION PROCESSING
BUSINESS WEEK: June 29, 1981

providing Canadian business with the opportunity for further expansion. The Globe and Mail Report on Business of October 12 1981 under the title "Computer Aided Learning Becomes a $5 Billion Market" reports that Telidon and a special computer assisted language Natal (National Author Lanuguage) developed by the National Research Council of Ottawa provide Canadian companies with potentially high penetration of two major markets, the educational and the corporate training fields. Initial results of an experiment linking Telidon and Natal suggest a mass audience for computer assisted learning can be reached. Because Videotex technology could provide an effective means of distribution, computer aided learning will come to its own in the 1980s. At the IV World Conference of Banking Institutes recently held in Montreal it was reported that on-line interactive and individual capabilities of computer assisted learning can cut corporate training costs by 25% as well as significantly increase the students' comprehension of subject matter.

The question as to whether or not a Telidon health care data bank is a viable commercial proposition is difficult to answer. The public at large has a negative demand function for advice about health when they have no need for it; as is evident by the increase in sales of tobacco, alcohol and non-nutritious foods and the reluctance of the public to adapt to new behaviourial modifications such as wearing a car seat belt. However, recognizing that the market for such a data bank would be composed of customers across North America it is possible that sufficient interest exists to justify such an investment. Certainly some market research of the potential value of a Telidon health care data bank would seem appropriate.

THE APPLICATION OF TELIDON IN HEALTH CARE

In order to determine how the Ministry of Health could use Telidon, interviews were conducted with key persons in the Ministry (see Appendix 2). Prior to being interviewed these persons were given a discussion paper describing the technology and its possible applications in health services delivery. The purpose of this discussion paper was to provide the interviewees with background information about Telidon. During the initial stages of the interviews sales brochures from Telidon hardware manufacturers were used to illustrate how the technology functions. This exercise was necessary because few of the persons being interviewed had had any previous exposure to the technology. Questions at the interview were directed to determine:

1. What possible application of Telidon technology existed in their respective areas of operation in the Ministry of Health?
2. What were the possible broader implications of Telidon technology in health services delivery?
3. To what extent would Telidon technology:
   a) be an add-on to existing systems?
   b) be a substitute for existing systems?
   c) improve the effectiveness of the Ministry's goals?
   d) improve efficiency in accomplishing the Ministry of Health's objectives?
4. What is the role of the Ministry of Health in the further exploitation of the Telidon technology for health services delivery in Ontario?

In responding to this line of questioning those interviewed identified three areas where the Telidon technology could be applied. These were: the education and upgrading of health workers across the province, the education of the health care consumer and improved use of health data for management purposes. The following overview of Telidon application in these respective areas discusses the Ministry's need to accomplish its objectives, the problems that the Ministry currently encounters with the prevailing technology, how the advent of Telidon technology could benefit the Ministry and what type of modus operandi is envisaged as being appropriate for action. Recognizing that Telidon is a new technology, the opinion was frequently expressed that the true usefulness of the innovation could not become totally apparent until there was sufficient expertise within the Ministry to test all possible applications.

During the interviews questions were also asked concerning the relevance of Telidon to the Ministry's Telemedicine program. Therefore this question is addressed.

The Continuing Education and Upgrading of Health Workers

The Ministry of Health is obliged to assess, evaluate and where necessary, upgrade the competency of various categories of health workers across the province. Certification and/or licensing requirements dictate that such groups as X-ray machine operators, laboratory personnel and ambulance attendants meet required standards of knowledge and competency in performing their tasks. In addition, health professionals in the more remote areas of the province sometimes have difficulty being kept informed about new techniques

and procedures that are being used in treatment and patient management, as well as being kept informed about new drugs that are available and their appropriate use.

At present the methods used to serve these needs are: arranging provincial and/or regional conferences; arranging for Ministry representatives to meet with groups in various regions of the province; arranging correspondence courses and audiovisual slide shows, and possibly publishing material in various journals. All persons concerned with this issue considered these methods of communication to be very expensive, a lot of trouble to organize, of questionable effectiveness in reaching specific target groups and in achieving desired standards, and difficult to keep current in a rapidly changing environment.

Telidon technology appears to offer the opportunity of making the required knowledge available to those who need it, such that, they can access their respective data banks when it is convenient for them to do. This approach would ensure a uniform standard of content across the province and these data can be updated as the need arises. It is also possible to assess the progress of health workers who interface with the proposed system, a criteria that is absent in current methods of upgrading, thereby demonstrating the overall effectiveness of the medium as an educational tool.

As noted previously, Canada is in the forefront of computer assisted learning and the combination of such technology with that of Telidon has been identified as a major breakthrough in continuing education and skill acquisition at all strata of the corporate sector. The application of such

innovations in addressing the need to upgrade and evaluate persons working in the Ontario health sector would appear to be a natural progression for applying these Canadian technologies.

During most of the interviews where the topic was discussed, it was recognized that the development of such educational programming would have to involve representatives of the respective disciplines as well as such bodies as the Ontario Medical Association and the Ontario Hospital Association. Furthermore, it was frequently stated that some coordination between the Ministry of Health and the Ministry of Education on this matter could prove to be mutually beneficial.

During general inquiries for this Report it was learned that TV Ontario have Telidon receivers strategically positioned in schools across the province as part of its Telidon pilot project. Therefore, if it was felt necessary to quickly assess the practicalities of such a program, the possibility exists for the Ministry of Health to arrange with TV Ontario a pilot educational program for health personnel in different regions of the province during non school hours.

<u>The Education of the Health Care Consumer</u>

The Ministry of Health, through the activities of its Health Promotion and Information Branch and through such vehicles as the new public health legislation is committed to increasing the consciousness of the general population with respect to their use of, and need for, health services. The following are some of the programs that have been developed by the Health Promotion and Information Branch to accomplish this goal:

1. A Slide Tape Presentation for Health Units on such topics as the Public Health Inspector, Nutritionist, Preventative Dentistry, Home Care, Medical Officer of Health/Health Unit and Public Health Nurse.
2. A variety of anti-smoking programs aimed at youth and involving colloboration with various youth and community groups.
3. The Health Crest Program - a community based self teaching health education program for children between the ages of 8 - 13.
4. Health Spell Program for schools involves curriculum guide, kit and CBC tape and educational record on video-tape. This is used in provincial schools.
5. Food for Health Awards This is designed to encourage healthier eating habits in students grades 9 - 13 and teachers and their families.
6. Sexually transmitted diseases This program consists of pamphlets, posters and a yet to be tested, teaching kit.

The above programs are, for the most part, aimed at the youth and their relative effectiveness in changing life style habits is difficult to assess in the short term. Such programs are generally recognized as expensive to develop and require a considerable amount of organization to deliver, and only reach a limited segment of the population in the province.

The Proposed Health Protection Act, the new Public Health legislation is composed of six parts as follows:

1. Communicable Diseases Control
2. Family Health
3. Nutrition
4. Environmental Sanitation
5. Preventative Dentistry
6. Home Accident Prevention

The implementation of this legislation is still in the planning stage. Therefore, it was with some considerable enthusiasm that the public health staff interviewed expressed interest in learning about Telidon technology and discussing its application to their area of operation. Based on first impressions there was general agreement that the execution of programs in the above areas could possibly be achieved more expeditiously through Telidon technology than through the use of more traditional means.

Those persons interviewed with particular interest in the application of Telidon technology for the maintenance and promotion of good health expressed a need to aim such programs at responsive audiences. Several of the physicians interviewed identified the doctor's office waiting area as being an ideal locality for Telidon terminals with access to appropriate data banks. This application would save doctors from having to repeat the same advice to patients. Examples of possible subjects that could be covered using Telidon are: well baby visits, nutrition counselling, birth control and smoking cessation. It was also felt that this application could equally

well be applied in hospital ambulatory care departments, public health units and Health Service Organizations (HSOs). Also inpatient orientation may be further enhanced using Telidon. For example, it was noted by several persons interviewed that TV is currently being used at University Hospital, London, Ontario for the purpose of orienting inpatients. In these environments people are more receptive to receiving information about their health.

The extent to which the general public would be receptive to health information being made available in public areas was not considered to be significant. While it was acknowledged that many of the major retail stores are presently using Telidon has a means of providing information to their customers, the overall reaction of those interviewed was that the use of Telidon for health promotion and maintenance in public areas like, shopping plazas, would need to be assessed further. However, in such localities as public libraries, schools, colleges and universities the target population may be more receptive.

While there was some doubt among those interviewed about the application of Telidon for raising the health care consciousness of the population at large, there was general agreement that it could be used as a community information vehicle. This application would inform the public about the availability of various health and social services and how to access them. Also the availability of Telidon terminals in homes could be of some assistance in providing support to the elderly and disabled who live alone, particularly where two-way communication is possible. In discussion of these applications with those interviewed it was recommended that the Ministry of Health communicate

with the Ministry of Community and Social Services when considering such developments.

While preparing this Report it was learned that, as part of the Telidon tourist package for the Ministry of Industry and Tourism, agents of that Ministry plan to include health information in their data banks for tourists visiting Toronto. This application could provide the opportunity for assessing the exent to which a particular section of the general public is receptive to receiving health information via Telidon.

There was frequent discussion by Ministry officials about the likelihood of people using their TV sets as a means of gaining information. However, it was generally agreed that future generations will have less trouble interfacing with this technology. As noted in one interview the 60s and 70s produced the TV generation and there is every indication from the way home computers are being marketed, that the 80s will see the advent of the computer generation. Not being able to interface to some degree with your average 'user friendly' computer in the 1990s could be as large a handicap as not being able to drive an automobile in the 1980s. In two interviews it was also observed that with increasing fuel costs, life styles in the future will be centred around home communications technology as much as they are presently centred around personalized transportation technology.

There was general agreement that the Ministry of Health should investigate further the extent to which Telidon could aid its campaign to improve life styles. All those interviewed with an interest in this area recommended that the Ministry support appropriately designed pilot studies to test Telidon

technology for raising the health consciousness of the population.

The Management of Health Services Delivery

The Ministry of Health has to process data in order to demonstrate fiscal and legal accountability as well as to support planning and research functions. Ideally such data should be current, relevant and readily understandable by those who have to work with it. The ability to be able to key into data banks within the Ministry and outside, and to be able to ask questions, was identified by several persons interviewed as an increasingly desirable capability. Such a capability becomes very urgent in an era of finite resources management and, in which, the demand for services increases as the proportion of elderly people in the population increases. However, it was acknowledged that the data that are available in the Ministry tends to be somewhat dated, usually of limited relevance to the issue being addressed and, more often than not, difficult to comprehend.

The Telidon technology may be useful in presenting statistical data in a more attractive graphical format. Considering the need for such groups as district health council members, hospital trustees, health professionals and administrators as well as Ministry of Health Officials to be able to quickly assess the prevailing situation, the presentation of data in an attractive, easy to understand format could be very important. However, since most data processed by the Ministry is of a textual, alphanumeric nature, it was doubted by most persons interviewed that Telidon technology offered the most efficient software characteristics for the type of interactive data banks desired. Subject to further refinement of such software capabilities a

closed interactive data bank using the Telidon technology could foreseeably have an impact on various decision making elements in the health sector.

Telecommunications is an expanding field and the eventual outcome of developing communication linkage between various sections is difficult to predict. One senior official interviewed felt that pilot studies with Telidon terminals should be instigated involving such linkages as:

consumer/professional

professional/professional

professional/hospital

hospital/hospital

Support for the professional hospital link was widespread among those interviewed. Considering the hospital to hospital linkage there was some interest expressed in testing the concept of an electronic bed registry in a geographic locality where there are several hospitals in close proximity to one another. Such an innovative approach, using Telidon, when linked with ambulance dispatch centres may lead to more efficient and effective use of available beds. It was suggested that the Telidon system could be useful for colour coding such determinants as physician privileges for the respective hospitals, if it were felt necessary.

As part of the discussion on telecommunications and linkages between various parts of the health system, a brochure put out by the Northern Telecom introducing their Display phone was shown to all Ministry personnel being interviewed. In addition to having all the features of an advanced telephone, the Display phone is capable of transmitting and receiving data through the

use of a keyboard and CRT display. The Display phone provides both enhanced voice and data communication capabilities as well as advanced time management services and is packaged in a desk top unit. As a data terminal it can be used to access both remote data base services using a built in modem for transmitting across the telephone network, and local data services via a standard RS-232 connector. The Display phone facilities accesses to data banks through the use of a unique automatic log in feature, in conjunction with a series of 'soft keys'.

In addition to interfacing with local data banks the Display phone can access the Telidon system and serve as a point of entry to the new intelligent network concept developed by the Computer Communications Group of the Trans-Canada Telephone System known as the i-Net Gateway. Plans are now underway to run a field trial of this concept in the Canadian marketplace during 1982. According to brochures put out by the Computer Communications Group the i-Net Gateway is designed to simplify the process of gathering, using and communicating information. The i-Net Gateway can be accessed from virtually any region of Canada using an alphanumeric or alpha-geometric terminals. The application of such technology in the management and effective delivery of health services would appear to be worth exploring further.

Telidon and Telemedicine

Several Ministry officials interviewed, enquired about the possible relationship between Telidon and the Ministry's Telemedicine program. In order to understand the differences between these two forms of communications technology, it is necessary to appreciate the type of interactive environment

both exhibit. Telemedicine is intended to serve as an audio-visual communication link between various centres across the province. The purpose of this linkage is to provide instant expert opinion on case management, that is, to provide a consultation through use of the electronic media. Telemedicine can also be used to provide clinical supervision of medical students who are gaining experience practising medicine in the more remote areas of the province. The main attractive feature of Telemedicine is that it can provide instantaneous dialogue between health professionals across the province. The major drawback being that all the main participants have to be available at the same time in specific localities in order to communicate with each other, and there has to be elaborate technical support to facilitate such communication. Also the information being relayed has to be treated with every precaution to safeguard confidentiality.

The interactive nature of Telidon is between the user and a data bank. The true value of this interaction in terms of its immediate relevance is dependent upon the frequency with which the data bank is updated. Basically, Telemedicine is an extension of the service currently being provided by the telephone whereas Telidon is a somewhat sophisticated electronic library. Both technologies appear to have potential applications in enhancing the provision of health services in a jurisdiction like Ontario where major centres of knowledge and learning are able to provide support to the more remote communities of the province.

TELIDON LANGUAGE - PDIs

The success of the Canadian Telidon system has been made possible largely through the development of the communications protocol known as Picture Descriptions Instructions (PDIs), at the Communications Research Centre of the Department of Communications. Basically, Picture Description Instructions are software that provides the applications programmer with an interactive programming language to aid in the definition of a picture coding system. This coding system and the terminals have essentially three modes of operation which are described as follows:

1. The alphanumeric mode is the basic mode of the system. It may be used to present alphanumeric data or to annotate graphical drawings. This mode is considered the default mode so that a videotex terminal in its initial state will be capable of operating as a conventional alphanumeric business terminal.

2. The geometric mode allows drawings to be presented in terms of the geometric drawings primitives of POINT, LINE, ARC, RECTANGLE and POLYGON. The coordinates of the end points and the vertices of the geometric primitives are communicated in order to achieve independence from the specific display resolution of a terminal.

3. The photographic mode of operation allows an image to be described either in point manner or in a run-length or otherwise encoded manner transmit an entire picture on a bit by bit basis much like a facsimile machine. Although it is possible to transmit an entire picture on a bit by bit basis much like a digital facsimile, it is envisaged that this mode will have its greatest use for describing small sub areas of the display screen. Even

real photographic images can be handled on a point by point basis.

The PDIs are a compact set of commands describing pictures. Each command consists of an opcode followed by a number of bytes of data. The coordinates specified by the data are independent of the physical resolution of the apparatus which may be a television set with perhaps 256 positions of resolutions in a horizontal direction, or a high resolution display apparatus with 1,024 positions or more. Since coordinate positions are specified as a fraction of the width of the display screen, the last significant bits may be dropped when they are not needed. The independence of PDI coding scheme from specific terminal hardware implementation is of particular importance as future enhancements are developed; these can be added to the Telidon system in a smooth and compatible manner.

In addition to being independent of terminal design the PDIs exhibit the following desirable characteristics:[1]

1. They are very efficient in storage and transmission of data.
2. They can be the basis for data bank creation procedure which can utilize a variety of hardware/software technique ranging all the way from very sophisticated automatic pattern recognition systems to an inexpensive package using the Telidon terminal (with keyboard) and a simple language interpreter in the host data bank computer.

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[1] Telidon - A Review Herbert G. Brown & William Sawchuck IEEE Communications Magazine January 1981 pp. 22 - 28

3. They can be used with almost any display technology where, of course, certain desirable features (such as rate of picture presentation, random addressability of image space, higher resolution, large selections of colours, etc.) will only be exhibited to the degree that the particular display technology permits.
4. They are a subset of a more general set of instructions permitting manipulation, transformation, and presentation of images that meet the requirements for full dynamic animation sequences as well as improved interaction techniques.

TELIDON DATA BANKS

Data banks are to the Telidon display units what broadcast stations are to television and radio receivers. At present Telidon display terminals are of little value because there are not many data banks that can be accessed. Similarly, 20 years ago if one had a TV set there were not many television stations one could tune into. Agencies interested in using the Telidon medium to supply information would have to develop 'pages' of information to be presented on Telidon terminals. These 'pages' would have to be stored in a central computer data bank.

The organization and commitment necessary in order to establish and continue to update these data banks will be a major portion of the ongoing costs of an entire Telidon network. This organization and arrangement of data within the Telidon data bank is very important. Anyone who has taught using a blackboard and chalk, and then starts to use the overhead projector has to set up their information such that it can be sequenced on a series of overhead transparencies. Similar organization of information is necessary when creating Telidon pages for storage in the data bank.

The arrangement of pages most commonly used at present is known as the 'tree structure' format. Information arranged on branches of a tree structure is relatively easy to access. Information that is indexed at an appropriate decision of a branching structure serves as a filtering process. Also quick access to various branches of the tree can be accomplished by cross referencing several branches of the tree.

More complex data retrieval techniques may be employed in the future. Brown and Sawchuck perceive a keyboard being employed to do keyword searches and the eventual development of a query language. The actual success of such sophisticated retrieval techniques will depend largely on user acceptance.

TELIDON HARDWARE

Participants in the Telidon system can be categorized as either the information providers or the information receivers. An information receiver requires a display terminal (TV set) that has been adapted to receive and decode PDI instructions and has a means of interacting with the data bank. Interaction is possible either through a hand held key pad, similar in appearance to a small calculator, or a more sophisticated alpha-numeric keypad. An example of specifications for a type of display terminal hardware on the market are given in Appendix 3.

The alpha-geometric photographic PDIs coded bit-plane memory display technology that constitutes the Telidon language was designed to meet the following display characteristics:

- a wide range of resolution, and hence cost
- an animation capability (random addressability)
- selective erasure
- mixing of texts and graphics
- overwriting capability
- no constraints on colour range
- no constraints on form of picture (i.e. any line may intersect anywhere)
- functions on the simplest display processor

On reviewing these characteristics Brown and Sawchuck state that "The rapid advances in the state of the art in electronics in recent years have justified this choice (of characteristics). The cost of memories has dropped tremendously with the result that high resolution pictures may now

be sorted and displayed on home television sets at a modest cost. In addition, the introduction of inexpensive microcomputers has allowed sufficient sophistication to be programmed into a terminal so that a compact, efficient communications code can be used."

In order to become an information provider one requires a capability to create, edit, store and recall PDIs encoded images. Appendix 4 provides an example of the specification for such hardware currently on the market.

The independent nature of Telidon technology means that information providers can dedicate their resources to data bank content and design. The information provider can design images with overlays, animation and colours, including greys. The application of pattern recognition techniques can avoid the need to recompose and reenter existing alpha-geometric data.

The information providers in Canada have formed an Association called VISPAC (Videotex Information Service Providers Association of Canada). The purpose of this Association is to represent their mutual interest and to support the orderly growth of Videotex across the country. This group represents a broad spectrum of industry, government and non-profit organizations.

The price of Telidon equipment has been falling steadily since the first terminal was built in 1978 and most experts agree that the consumer price for the Telidon decoder will have to fall to $300.00 Cdn. by 1983. Electrohome of Kitchener, Ontario, one of four Canadian firms manufacturing Telidon terminals, predicts that, as production increases, the cost of the equipment will fall by a factor of three in the next three years. Electro-

home expects the business market for the terminals to develop before the consumer market takes off. As a result, in 1981, the Company expects to produce more than a thousand business user terminals, complete with colour vision monitors, Telidon decoder and modem at a total cost of $3,876.00. As sales pass the 50,000 a year mark in 1983, the Company will be manufacturing complete home consumer package with monitor, television capability, modem, teletext receiver, decoder and possibly keyboard capabilities for $1,100.00. Appendix 5 is a stand alone summary prepared by the Hemton Corporation of Ottawa, Ontario describing, in some detail the technical intricacies that pertain to the relationship between Telidon information providers and information receivers.

TELIDON COMMUNICATION

A Telidon data bank, in order to be accessed by a Telidon user will have to be connected to the user terminal through some means. Cable TV companies will probably become major carriers of Telidon information. Also TV broadcast agencies, such as TV Ontario and the CBC, will probably provide Telidon type data. It is conceivable that the public education type of health data could be relayed over such common carriers. However, for reasons of confidentiality it will probably be undesirable for specific sets of health data to be carried by such means. Some form of telecommunication that is dedicated to the transfer of health data would seem more appropriate.

At the present time Telecommunications is experiencing a period of intense and rapid technological change involving such innovative means of communications as satellites, microwaves and fibreoptics. Also, with the advent of inter-connect being allowed on regular telephone lines, it is possible to apply many innovations locally in using telephone communications technology. For example, regionally located Telidon data banks can be used locally over the regular telephone lines without incurring any long distance charges. Such data banks can be updated during off peak hours very easily, and very economically, thereby maintaining the current nature of their contents at a relatively low cost.

THE COST OF TELIDON IN HEALTH CARE

Telidon is a new technology that appears to offer many applications for enhancing health services delivery in the future but has yet to be totally proven. As indicated in several sections of this Report, the cost of Telidon hardware will decrease over the next five years. Similar cost reductions have recently occurred in such other electronic markets as pocket calculators and digital watches. It has also been noted in this Report that the cost of developing the necessary data banks could be substantial.

It is not uncommon in the health care industry for the collective wisdom of individual experts to be filtered into a single volume of text on a particular topic. Our present technology, the published document, is not appropriate for easy revision after publication. In an era of rapid change this inconvenience can cause problems. All indications are that such practices are easy to accomplish using Telidon technology. Therefore, the nature of the output of such collective action is different under the two technologies and hence cannot be compared solely on direct costs.

While the development of content for health care Telidon data banks may be accomplished through the voluntary participation of various interest groups, a tradition long established in Ontario, the necessary software development to make such data banks easy to access and use will require expertise in appropriate software capabilities. The hiring of this expertise will be the major determinant of on-going cost in future exploitation of Telidon technology. Such expertise can be developed inhouse or hired on a part time basis as the need arises. (See Appendix 6) In addition, some

expenses can be expected when the transmission of data between the user and the data bank includes long distance rates.

To justify the use of Telidon in the provision of health services, the costs of accomplishing tasks currently being achieved by present day technology will have to be less using Telidon, or the task being considered will have to be re-defined in terms of enhanced accomplishment of stated goals. This should be possible using a new technology, otherwise there is no likelihood for any justification of its application.

CONCLUSION AND RECOMMENDATIONS

Telidon has barely emerged from the embryonic (laboratory) stage of its development. Therefore, a period of wait and see may be in order before embarking on any major investment of Telidon technology in health care. However, to become somewhat involved at this stage will ensure a better state of readiness should Telidon be as extensively used in the future as it is claimed will happen. In anticipation of such events a Canadian financial institution is reported tc have invested in Telidon hardware so that is executives will be accustomed to interfacing with it. The rationale for this investment being that the financial institution in question will be the first to introduce home electronic banking in Canada. Such services are already available in the U. S. using Videotex technology.

Ministry of Health personnel interviewed generally agreed that the communication technology known as Telidon appeared to provide some benefit towards meeting several of the Ministry's prevailing commitments. The support for this agreement varied from very cool, to, in the majority of cases, red hot. Since the subject being considered involves a new technology, it was acknowledged by most of those interviewed that the implications of applying such innovation in the delivery of health services are difficult to totally assess. However, there was general agreement that the Ministry of Health should actively support the application of Telidon technology in health services delivery. Such support should consist of providing a coordinating function for health -elated applications of Telidon, thereby establishing standards and guidelines for its further development. Also the Ministry should sponsor specific field trials of Telidon technology that

will assess its true effectiveness, relative to the more traditional means of achieving desired goals.

In consideration of further action by the Ontario Ministry of Health in the introduction of Telidon technology to the health care industry it is recommended:

1. That the Ministry of Health act in collaboration with various interest groups, including the Ministry of Education, to develop Telidon pilot studies to evaluate the effectiveness of the technology for the continuing education and upgrading needs of health personnel across the province.

2. That the Ministry of Health in collaboration with professional associations and colleges, investigate further the extent to which Telidon technology can facilitate the continuing education and upgrading needs of health professionals.

3. That the Ministry of Health develop data banks on such topics as well baby visits, nutrition counselling, smoking cessation, birth control, etc. and assess the receptiveness of the public towards this information in such settings as doctors' offices, hospital ambulatory care units, public health units and Health Service Organizations (HSOs).

4. That the Ministry of Health sponsor a market survey to determine the financial viability of an Ontario Health Care Telidon data bank for commercial access by information receivers across North America.

5. That the Ministry of Health in collaboration with the Ministry of Community and Social Services assess further the practicalities of a community resource Telidon data bank which will provide information to the public about services that are locally available and how they should be accessed.

6. That the Ministry of Health in collaboration with the Ministry of Community and Social Services assess the extent to which Telidon technology can be used as a means of two-way communication with the elderly and the disabled who live alone.

7. That the Ministry of Health establish pilot studies to evaluate the advantages of Telidon between such combinations as:

   consumer/professional

   professional/professional

   professional/hospital

   hospital/hospital

   health care outlet/Ministry of Health

8. That the Ministry of Health establish a pilot study to evaluate the advantages of Telidon or similar technology, to provide a central bed registry for geographically related hospitals and ambulance dispatch centres.

9. That the Ministry of Health assess what implications Telidon may have for EDP systems, such as the Computer Assisted School Health (CASH) program, which it is currently responsible for administering.

10. That the Ministry of Health assess further the extent to which Telidon technology, relative to similar communications technology is suited to the updating of administrative, technical and clinical procedures which it mandates at central offices for dissemination to regional offices.

11. That the Ministry of Health assess further the extent to which Telidon technology can be made to interact with health care data banks to provide interpretation of statistical data graphically and in colour so that decision making elements within the health care system will be more receptive to the message being relayed.

12. That the Ministry of Health immediately investigate the application of all forms of modern telecommunications technology in order to establish an efficient and effective communications between itself, its agents and the providers of health services across the province, so that fiscal and legal accountability can reasonably and quickly be demonstrated and pertinent data captured.

Telidon Publications

Bailey, Allen and Cox, Anne. "Getting a Jump on the Whole Wired World" Macleans, 25 September, 1978, pp. 45-46.

Blatt, J., Rosch, G., and Osterer, C. "The Promise of Teletext for Hearing-Impaired Audiences." IEEE Transactions on Consumer Electronics. Vol CE-26, No. 4. November, 1980. pp 717-722.

Bowers, P.G., Cioni, M. Telidon and Education in Canada. Undated.

Bown, H.G., O'Brien, C.D., and Sawchuk, W. Telidon Technology Development in Canada

Bown, H.G., O'Brien, C.D., Sawchuk, W., and Storey, J.R. A General Description of Telidon: A Canadian Proposal for Videotex Systems. CRC Technical Note 697-E. December, 1978. (English or French).

Bown, H.G., O'Brien, C.D., Sawchuk, W., and Storey, J.R. "Telidon: A New Approach to Videotex System Design". IEEE Transactions on Consumer Electronics, Vol. CE-25, No. 3, July 1979, pp. 256-268.

Bown, H.G., O'Brien, C.D., Sawchuk, W., and Storey, J.R. Picture Description Instructions for the Telidon Videotex System. CRC Technical Note 699-E. November, 1979. (English or French).

Bown, H.G., O'Brien, C.D., Sawchuk, W., Storey, J., and Marsh, R. "Comparative Terminal Realizations with Alpha-Geometric Coding." IEEE Transactions on Consumer Electronics. Vol. CE-26, No. 3. August, 1980. pp. 605-617.

Broadcasting. Teletext: "TV Gets Married to the Printed Word". August, 1979. pp. 31-36.

Broadcast and Social Policy Branch, DOC. Social Implications of Computer Based Communications Systems. August, 1979.

Canadian Economic Services Ltd. Videotex and the Canadian Labour Market: Some Potential Effects. Report prepared for DOC. 7 May, 1979.

Canadian Videotex Consultative Committee. "General Functional Requirements of a Closed Caption Encoder". June, 1980.

Canadian Videotex Consultative Committee. "General Functional Requirements of a Closed Caption Inserter". June, 1980.

Canadian Videotex Consultative Committee. "General Functional Requirements of a Closed Caption Decoder". June, 1980.

Canadian Videotex Consultative Committee. "Terms of Reference and Membership Lists". July, 1980.

Carey, J., Carpenter, T., Connell, E., Elton, M., Nisenholtz, Schober, G. Teletext and Public Broadcasting. Alternate Media Centre, School of the Arts, New York University, April, 1980.

Carne, E.B. and Mokhoff, N. "Home/Office Communications: The Wired Household; Office Automation: a Challenge". IEEE Spectrum, October, 1979, pp. 61-69.

CCITT Study Group VIII. International Information Exchange for Interactive Videotex. Montreal, 2-6 June, 1980.

Centre de Recherches, College Universitaire de Saint Boniface. Headingly avant et aprés le projet "IDA". Phase I (Avant). March 1980.

Chambers, J.P. "Enhanced U.K. Teletext Moves Towards Still Pictures." IEEE Transactions on Consumer Electronics. Vol. CE-26, No. 3. August, 1980. pp. 527-554.

Clarke, K.E. "The Application of Picture Coding Techniques to View Data." IEEE Transactions on Consumer Electronics. vol. CE-26, No. 3. August, 1980. pp. 568-577.

Cohen, Dian. "A Call to Arms". In Search. Vol. VII, No. 2. Spring 1980. pp. 4-9.

Costa, J.M. and Chitnis, A.M. "Planning the Videotex Network". Canadian Electronics Engineering, April, 1980, pp. 27-50.

Criner, K. and Johnson-Hall, M. "Videotex - Threat or Opportunity." Special Libraries, September 1980. pp.379-385.

Crowther, G. O. "Adaption of U.K. Teletext System for 525/60 Operation." IEEE Transactions on Consumer Electronics. Vol. CE-26, No. 3. August, 1980. pp. 587-599.

Crowther, G.O. "Dynamically Redefinable Character Sets-D.R.C.S." IEEE Transactions on Consumer Electronics. Vol. CE-26, No. 4. November, 1980. pp. 707-716.

Dages, C.L. "Playcable: A Technological Alternative for Information Services." IEEE Transactions on Consumer Electronics. Vol. CE-26, No. 3. August, 1980. pp. 482-486.

Department of Communications. Telidon Data Base. Version 1.0. September 1979.

Department of Communications. PDI Translator Programs. December, 1979.

Dotto, Lydia. "The Information Revolution". The Canadian Business Magazine. May, 1979. pp. 58-64.

EMMS. "Viewdata, Teletex and the (Newspaperless) Home". Vol. 3, No. 21, Nov. 1, 1979, pp. 4-8.

Fraser, Jack. "From "POTS" to "PANS": Videotex Development in Canada". Presented at Viewdata 80 conference, 26 March, 1980, London.

Godfrey, David and Parkhill, Douglas, eds. Gutenberg 2 - The New Electronics and Social Change. Press Porcepic Ltd. Toronto, 1979.

Gotlieb, C.C. Computers in the Home: What They Can Do for Us - And to Us. Institute for Research on Public Policy, August, 1978.

Grundfast, J. and Baer, W. Regulatory Barriers to Home Information Services. Presented at the Sixth Annual Telecommunications Policy Research Conference, Warrenton, Virginia, 12 May 1980.

Haslam, G. Information Provider Activities in Canada. undated.

Haslam, G. "Fear and Opportunity in the Information Marketplace". In Search. Vol. VII. No. 2. Spring 1980. pp. 18-25.

Hedger, J., Raggett, M. and Warburton, A. "Telesoftware - Value Added Teletext." IEEE Transactions on Consumer Electronics. Vol. CE-26, No. 3. Augus 1980. pp. 555-567.

Hickling - Johnston Ltd. Field Marketing Trial Strategy for Telidon. Report for DOC, February, 1979.

Hirashima, M., Fukuda, S., Kawakami, T., and Uno, K. "Teletext Receiver: A Circuit Design fo the Sampling Check Regeneration." IEEE Transactions on Consumer Electronics. Vol. CE-26, No. 3. August, 1980. pp. 657-664.

Howkins, J. "The Information Societies". In Search. Vol. VII,. No. 2, Spring 1980. pp. 10-17.

Infomart. Inside Videotex: The Future ... Now. Proceedings of a conference. Toronto. 13-14 March, 1980.

Ishigaki, Y., Odada, Y., Hashimoto, T., and Ishikawa, T. "Television Design Aspects for Better Teletext Reception." IEEE Transactions on Consumer Electronics. Vol. CE-26, No. 3, August, 1980. pp. 657-664.

Jackson, Marilyn. Telidon Index. 22 November, 1979.

Jackson, R.N., Reid, A.A., Clarke, K.E. "Home Communications: I-Teletext and Viewdata; II-Creating a Market for Preset1; III-Videotext Standards". IEEE Spectrum, March, 1980, pp. 26-35.

Japan Information Processing Development Center. New Communication Media in Japan. Sankyo Printing, Japan, 1979.

Johnson, G.A. "Vista and the New Information Marketplace". Canadian Futures, Vol. 1, Iss. 2.

Kates, Josef. Toward International Technological Interdependence. Science Council of Canada, Ottawa, 1979.

Kaye, Roger. A Possible Structure for the Videotex Industry in Canada. Presented at first CCITT Symposium, Geneva, 15 May, 1979, for DOC.

Lambert, O., Brusq, R., Marti, B., and Poignet, A. "Antiope and D.R.C.S." IEEE Transactions on Consumer Electronics. Vol. CE-26, No. 3. August, 1980. pp. 600-604.

Lancaster, F.W. Information Retrieval Systems: Characteristics, Testing and Evaluation. John Wiley & Sons, New York, 1979.

Larratt, R., ed. Inside Videotext: the future ... now. Proceedings of a seminar. Toronto. 13-14 March, 1980. Infomart, 1980.

Lipoff, S.J. "Data Analysis Procedures and Presentation Formats for Broadcast Teletext Field Tests." IEEE Transactions on Consumer Electronics. Vol. CE-26, No. 3 August, 1980. pp. 507-519.

Madden, J.C. Videotex in Canada. Ministry of Supply and Services Canada, May, 1979. (Bilingual).

Madden, J.C. Telidon Program Plan. December, 1979.

Madden, J.C. Telidon in Canada. Presented at a conference, New Developments in Communications Law and Policy, Ottawa, Jan. 24-26, 1980.

Madden, J.C. Telidon Evolution and Future Prospects. Presented at a conference, American Association for the Advancement of Science, Toronto, 7 January, 1981.

Marsh, R. Videotex Development in Canada. Presented at a conference, VIDCOM 80, Cannes, France, September 29, 1980.

Muter, Paul, Treurniet, William, and Phillips, Dorothy. "Computer-aided Learning and Videotex". Proceedings of the Third Canadian Symposium on Instructional Technology. Vancouver, February, 1980.

Orton, Marlene. "DOC's Two-way Videotex System". Broadcaster. September, 1978.

Ostry, Bernard. "The Two-way TV Revolution: Social Implications of the New TV Technology". Perception, November/December, 1979, pp. 24-27.

Paez, J.R. "Selection of a Videotex System for the 501 Project." (Translated and Condensed by P.M. Barros.)

Papp, R.G., Gaessler, L., & Chitnis, A.M. A Versatile System for Creating and Managing Text and Graphics for Videotex and Related Applications.

Parkhill, Douglas F. An Overview of the Canadian Scene. Paper presented at Viewdata '80, 26-28 March, 1980, London.

Peterson, Lorne, "Social Dangers in the Information Revolution". In Search, Winter, 1980. pp. 20-24. (bilingual).

Phillips, D.A. "Telidon, the Canadian Videotex System and its Implications for Information Science. In Proceedings of the Seventh Annual Canadian Conference on Information Science, Canadian Association for Information Science, Banff, Alberta. May 12-15, 1979.

Pierce, W.D., Reid, S.J., Peterson, W.M. "A Low Cost Terminal for the 1980's: Project Green Thumb." IEEE Transactions on Consumer Electronics. Vol. CE-26, No. 3. August, 1980. pp. 487-506.

Pitarelli, M., Seal, J. and Story, J.R. "An Approach to the Dynamic Allocation of Lines in the Vertical Blanking Interval of Television Signals". Presented at a meeting of Canadian Association of Broadcasters, September, 1979.

Plowright, T. Social Aspects of Videotex Services: Proposed Research Directions. DGBSP, November, 1980.

Practical Computing. "Prestel - The Start". October, 1979. pp. 64-68.

Roger, W. Hough and Associates Limited and Communications Studies and Planning Ltd. Pilot Study to Develop a Methodology to Forecast Canadian Demand for New Home and Business Telecommunications Services in the Period 1980-1990. DOC, May, 1979. (DOC Library P 91 C655 R64 (1979).

Sachs, Jonathon. "Computerized Communications Systems for the 1980's". Interface age. March, 1980. pp. 66-68.

Science Council of Canada. A Scenario for the Implementation of Interactive Computer-Communications Systems in the Home. July, 1979. (TK 7882 I6 S35 - DOC Library. (Available free of charge from the Science Council).

Sechet, C. "Antiope Teletext Captioning." IEEE Transaction on Consumer Electronices. Vol. CE-26, No. 3. August, 1980, pp. 618-621.

Sigel, Efrem, ed. Videotext: The Coming Revolution in Home/Office Information Retrieval. Knowledge Industry Publications, Inc., White Plains, N.Y. 1980.

Shlien, S., Sawchuck, W., O'Brien, D.C., and Saaltink, M. Development of an Information Input System for Telidon. Presented at Sixth Conference of the Canadian Man-Computer Communication Society, Ottawa, May 1979.

Smirle, J.C., Lum, Y.F , and Bown, H.G. International Videotex Standardization: A Canadian View of Progress towards the Wired World. Department of Communications, March, 1980 (?).

Story, J.R., Bown, H.G., O'Brien, C.D., and Sawchuck, W. "Overview of Broadcast Teletext Systems for NTSC Television Standards." In Papers from 14th SMPTE Television Conference, Toronto, 1-2 February, 1980. pp. 116-129.

Story, J.R., Vincent, A., and Fitzgerald, R. A Description of the Broadcast Telidon System. Presented at the IEEE Chicago Spring Conference on Consumer Electronics. June 18-19, 1980.

Sweetman, Keri. "The Chaning Face of Videotex". Telesis, One, 1980. pp. 7-11.

Tamec, Inc. Videotex Services: The Market Potential for Cable. January, 1979. (excepts. Full text available CRC library).

Thompson, Gordon B. Two Scenarios for an Information Society in Canada and their Technological Implications. Project Delta, Gamma, Montreal, October, 1979. (French or English).

Thompson, Gordon B. "Technology and the Information Society". In Search, Vol. VII, No. 2, Spring 1980, pp. 26-31.

Wilson, Larry. "The Changing Face of Videotex". Telephony, 2 June, 1980. pp. 18-23.

Wilson, Larry. "Planning a Videotex Trial". Paper presented at 2nd CCITT Interdisciplinary Colloquium on Teleinformatics, 10 June, 1980, Montreal.

Winsbury, Rex. The Electronic Bookstall. International Institute of Communications, London, 1979. (DOC Library TK 7882 I6 W 56 C.4).

Wright, David. "Is There a Good Market for a Good Technology?" In Search, Winter, 1979, pp. 3-17 (bilingual).

Zeman, Zavis and Russel, Robert. "The Chip Dole: An Overview of the Debates on Technological Unemployment". CIPS Review, January/ February, 1980, pp. 10-14.

APPENDIX I

TELIDON EQUIPMENT SUPPLIERS

The following companies make or sell Telidon user terminals and Telidon information provider system terminals:

AEL MICROTEL LIMITED
Burnaby, British Columbia.

BELL NORTHERN RESEARCH LIMITED
Ottawa, Ontario.

ELECTROHOME LIMITED
Kitchener, Ontario.

HEMTON CORPORATION
Ottawa, Ontario.

NORPAK LIMITED
Kanata, Ontario.

NORTHERN TELECOM
Weston, Ontario.

APPENDIX II

Ministry of Health officials interviewed about the potential application of Telidon in Health care.

Mr. R. Berry
Director
Program Development Branch (1)

Dr. B. Blake
Director
Public Health Board (1)

Dr. H. Demshar
Health Advisor
Health Promotion & Information Branch

Dr. E. Luterbach
Consultant Telehealth Program
Institutional Division

Dr. W. F. Lumsden
Senior Medical Advisor
Deputy Minister's Office

Dr. D. Psutka
Executive Coordinator
Emergency Health Service Group (1)

Mr. G. Ventura
Director
Ambulance Services Branch (1)

Dr. D. Willoughby
Director
Laboratory Services Branch (1)

(1) Interviews included participation of other department staff.

APPENDIX III

DISPLAY TERMINAL HARDWARE SPECIFICATIONS

Hemton Corporation
1686 Woodward Drive
Ottawa, Ontario. Canada
K2C 3R8 Telex: 053-3867

613-226-7790

ELECTRONIC PROJECTOR SYSTEM (EPS-1)
FUNCTIONAL SPECIFICATIONS

General Features

The Electronic Projector System (EPS-1) is a Telidon compatible terminal for the display of information that is ideally suited to business and educational applications. The EPS-1 can retrieve information (in Telidon page form) from either its own local storage or from a remote data base. These pages (or slides) can be loaded into the EPS-1 directly from a Telidon Information Provider System (IPS) or from an audio-cassette tape where the pages have been recorded and stored.

The information can be accessed randomly via a keypad (once it's been kept in its own local memory) or it can automatically display in a sequential fashion with a specific start time indicated for each page. In addition, a pre-recorded voice track or background music can accompany the sequential display of information. This is especially suitable for presentation purposes.

The ability of the EPS-1 to maintain a relatively high image display speed, while utilizing low bandwidth communications channels lies in the PDI encoding scheme itself. Rather than being forced to describe each picture element (pixel) in the raster display memory individually, images are typically communicated in terms of high level graphic primitives such as points, lines, rectangles, arcs, and polygons. Should the need arise for transmission of a facsimile-like image, the PDI protocol has a "bit" mode for pixel by pixel picture description.

Since the microprocessor controller in the PDI decoder is able to decipher these high level commands, the amount of information which must be transmitted is greatly reduced. This feature becomes especially important in interactive systems where response time is critical. For example, in a process control application, the status of the system being monitored can be quickly updated by transmission of a single polygon representing the current parameters for a functional module (e.g., a valve has gone from condition green to red).

The colour palette includes:-

Trans	Blue	Red	Purple	Green	Cyan	Yellow	Blink White
Black	Grey 1	Grey 2	Grey 3	Grey 4	Grey 5	Grey 6	White

Text Display

The EPS-1 provides four basic text sizes, each with double height capability and includes both English and French character sets. Either character set may be displayed in any of the colours available and in any size. The smallest character set provides twenty lines of forty characters per line.

Communications Interface(s)

The standard EPS-1 communication interface is via an asynchronous, full duplex, RS232C channel. The data rates may be factory preset from 75 to 9600 baud independently for receive and transmit. This allows the EPS-1 to be connected to a compatible telephone modem, two way cable network interface adaptor or directly to computer via a null modem. An optional integral modem is also available.

Physical Specifications

- Free standing enclosure 3 1/4"H x 20"W x 12"D
- Convection cooled
- Internally lighted on/off switch
- 25 pin "D" type RS232C connector (male)
- 15 pin "D" type connector for keypad
- Six BNC connectors for RGB and Sync (RS170 level) plus transparent and TV control signals (TTL level)
- Auxiliary 3 pin AC receptable
- Operational temperature 10^{o} to 35^{o}C
- Operational humidity 10-95% non-condensing
- Power requirements 60 watts 117 VAC +/-10%
- Cassette storage input/output interface
- RG179/u video coax cable set (six feet)
- 32 button wired keypad

Power

- Self-contained power supply, connects to standard 117V 160Hz line
- 400 watts (EPS-1, cassette recorder and monitor)

General Features

- Compact, low cost, colour raster display
- Microprocessor controller with PDI decoder software in ROM, conforming to CVCC standards
- 64K Bytes RAM for local image storage
- Full duplex, RS232C, asynchronous, serial communications interface
- 200 x 256 x 4 bit high speed raster video RAM
- 8 grey levels (black to white) 6 colours, blinking white and transparent pixel content
- RS170 level RGB video and composite sync. outputs
- Interface connector for keypad
- Free standing operation in convection cooled enclosure

Optional Features

- 13" or 20" diagonal colour monitors
- Large screen video projectors
- Integral modem
- Keypad/control panel with 12-32 wired switches

APPENDIX IV

PAGE CREATION HARDWARE SPECIFICATIONS

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ELECTRONIC PROJECTOR SYSTEM (EPS-2)

PRODUCT BRIEF

INTRODUCTION

The second generation Electronic Projector System (EPS-2) provides an efficient, user friendly means for creating, editing, storing and recalling PDI encoded images for the Canadian TELIDON information system.

The modular design of the EPS-2 software allows for the integration of new features in the future. A number of enhancements are already being planned, and will be merged with existing terminals as they become available. An optional programming kit will be made available to users who wish to add their own specialized utility modules to the system.

The functions of the EPS-2 can be divided into five subsystems:

1) Component editor - used for picture creation and editing in a completely free format.

2) Text editor - simplifies the entry, formatting and editing of textual information.

3) Utility package - this set of utilities is designed to simplify the entry of highly formatted pictures, and provide specialized functions, bar graphs, maps, special symbols, and so on.

4) Sketching package - this optional package will allow for free form sketching of pictorial data using a tablet (digitizer).

5) File package - this package will facilitate the task of managing and distributing TELIDON compatible files, including reception and transmission of files via an optional modem.

All of these subsystems will be compatible with each other. For example, a pie chart may be prepared using a special utility, then the component editor can be used to add annotation and graphics.

HARDWARE CONFIGURATION

The EPS-2 consists of a DEC PCP11/03 computer, a dual drive floppy disk system (RX02 compatible), a graphics processor, two display monitors, a keyboard and a single pedestal desk, all packaged to convey a familiar office environment compatibility.

The display processor is the key to the performance of the system. It has the advantage of recognizing the TELIDON PDI protocols, which ensures that the display characteristics of the EPS-2 match those of a user terminal (EPS-1).

The keyboard layout has been changed to a standard typewriter layout, and includes both a cursor control keypad and 18 special function keys.

The colour display monitor has been repackaged and substantially reduced in size, which is expected to reduce operator fatigue. The monochrome alphanumeric terminal will be installed in an identical enclosure.

SYSTEM DESIGN

The EPS-2 is designed to be simple to use and as such terminal operators do not require a technical background or extensive training. The experienced user can easily bypass the prompting and training aids that are built into the system, thus increasing throughput.

The operator is presented with two display screens. The first (colour) continuously displays the picture being created, while the second (monochrome) is used for displaying menus, status information, marker position, etc. By thus separating data and control, much more flexibility can be achieved. Detailed instructions and prompting can be provided for the novice user, without hindering the expert. Menu selection is performed by pressing keys on the keyboard, using dedicated keys for the most common functions, and mnemonics for those seldom used.

A graphics cursor may be moved about the screen to enter position information, using the keyboard cursor control keys or one of the optional input devices. Since the cursor is not used for menu selection, the cursor is not moved between operations.

COMPONENT EDITOR

The graphical editing functions have been greatly enhanced. It is now possible to group picture components so they may be manipulated together. These manipulations include changing various parameters such as colour, line texture, fill pattern, and so on. In addition, picture components can now be replicated, thus avoiding needless repetitive operations.

It is now possible to integrate 'BIT' PDI files with text and graphics using the component editor.

A new editing function allows the operator to edit previously created polygons, inserting or deleting line segments anywhere in the polygon.

TEXT EDITOR

The annotation (Format 1) text editor provides a simplified and consistent operation with the component editor. Thus mixed text and graphics can be easily edited at will.

Using this editor, it is possible to enter text strings anywhere on the display screen in any colour and any size. Strings may be treated as a group of characters (for moving, deleting, copying), or as individual characters for inserting or deleting characters. The text will appear on the display screen as it would appear on a user terminal, thus ensuring proper alignment of text and graphics.

UTILITY PACKAGE

Two modules will be included in the initial release of the utility package. The first module simplifies the task of entering pie charts, which can be tedious using the component editor.

The second module allows for the playback of TELIDON files as they would appear on a user terminal. A separate utility is required since the component editor must strip out WAIT and CLEAR PDI's. This utility also provides a means of inserting and deleting WAIT and CLEAR PDI's.

The utility package will be expanded as specific requirements arise.

SCHEDULE

Now Available: rotation and scaling, Format 0 text editor, tablet option support, Video Overlay System option, programming kit option, support for EPS-1 (Electronic Projector System)

Future releases will include: modem support for remote data base access, a sketching package, word processing functions, support for high resolution sytems, and specialized utilities.

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PROFESSIONAL SERVICES AND PAGE CREATON PRICE LIST

Page Creation	Hourly Rate
Design: concept development and storyboard preparation	$60.00
Page Creation	35.00
Telidon terminal charges	17.00

Professional Services	
Training and consulting	50.00
Demonstrations	35.00

Terms

Prices subject to change without notice.
2% ten days, net twenty days.

Effective 30 September 1981

APPENDIX V

THE HARDWARE COMPONENTS OF A STAND ALONE TELIDON SYSTEM

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TELIDON

STAND-ALONE SUMMARY

The implementation of a complete Telidon System, for information distribution, generates requirements in five main functional areas. Whether a small in-house configuration or a large scale public access system is proposed, all of these modules are implied. With reference to the attached diagram (Figure 1) the required modules are:

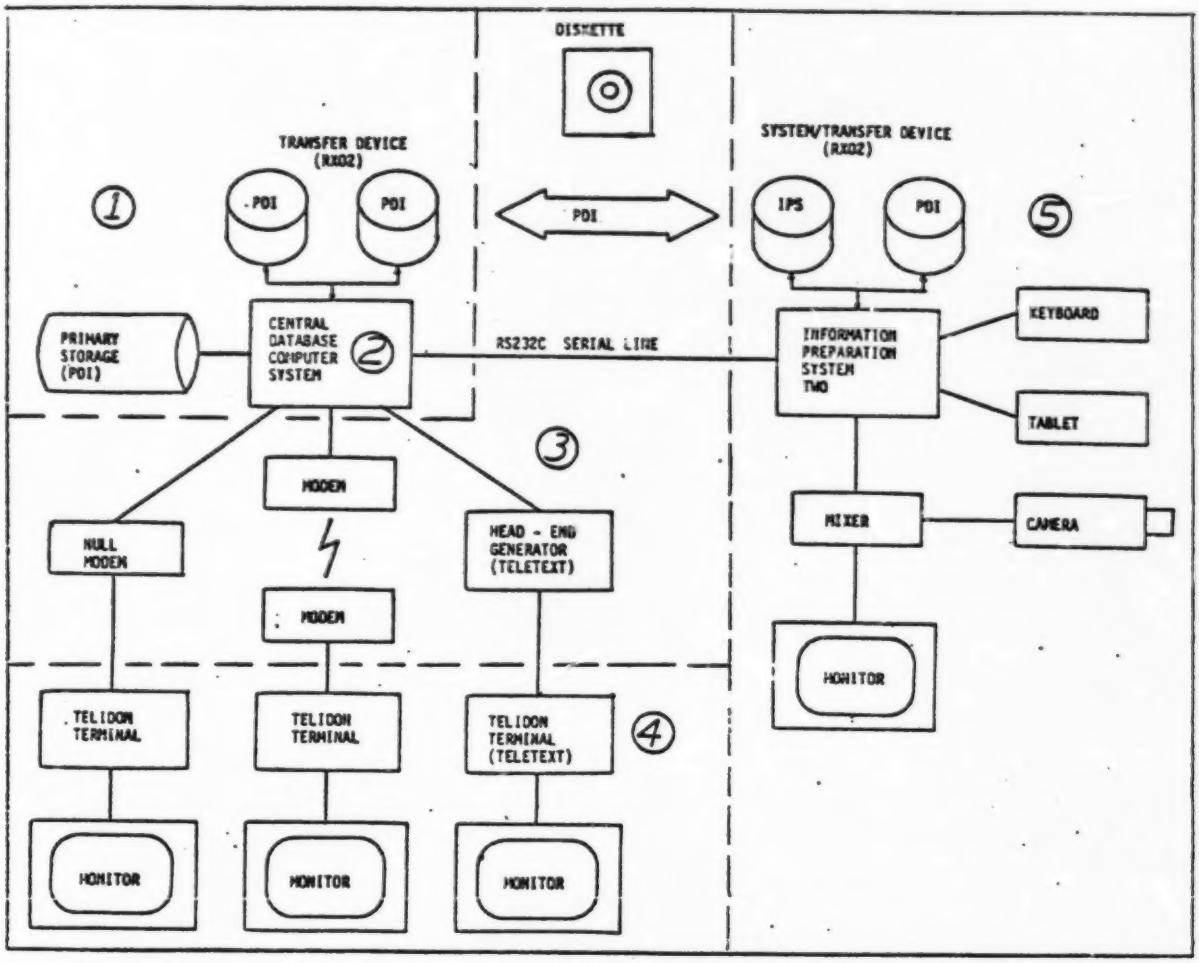
1. A central computer system with sufficient mass storage capacity for PDI data file storage and sufficient processing power to provide for real-time operation up to maximum anticipated loading. Although a low cost processor system would suffice for smaller systems, current implementations have typically used DEC PDP 11/34 or larger processor (see #2). The exact cost and complexity of the system selected will naturally depend on the total system configuration including the number of access ports which are to be provided.

2. A central data base update and control application program capable of inserting, deleting and maintaining a data base of the desired size. A portion of the application software will also be required to handle the anticipated input/output requests from either the picture creation stations or the user display units. The Canadian Department of Communications has developed just such a package to operate on DEC PDP 11 systems under RSXII-M. This is currently being licenced to potential users through Canada Patents and Development Limited (CPDL). Since the data files are essentially ASCII formatted and the I/O interfaces typically RS232 asynchronous serial communication, the development of a custom data base application package is certainly feasible for those users with the in-house software support.

3. A facility to support any of the planned local or remote data interfaces must be provided including direct RS232C serial lines, modems for remote installations compatible with the terminal and communication line specifications, and in the case of Teletext mode of information distribution a means of encoding the PDI data into either a broadcast (VBI) or full channel cable distribution system.

4. A facility by which prospective users of the system may request information contained in the central data base and have it displayed locally. Hemton Electronic Projector System (EPS-1) PDI decoders fulfill this requirement in either Videotex (RS232C) or Teletext mode of operation. In addition to 24 button keypads for input requests (wired or wireless), certain models will also support full ASCII keyboard interaction with the central computer system. The application program must naturally have a facility to differentiate the two types of input and generate the desired results.

5. A facility to allow for the creation of new "pages" of information, either textual or graphic, is essential in a complete stand alone system. Certain users may receive previously created "pages" of data from Information Providers for display on their own data distribution system. However the majority of users will desire to create their own pages, for insertion into the data base structure. Hemton Corporation Electronic Projector System (EPS-2) provides just such facility in a comfortable, user friendly environment. Having the ability to locally create, edit, store and recall PDI encoded files completes the final segment of the Telidon system.



FUNCTIONAL MODULES IN A TELIDON SYSTEM

1. Central Data Base Computer System
2. Central Data Base Application Software
3. Local/Remote Communications Facilities
4. PDI Decoder Units (Videotex/Teletext)
5. Page Creation Facilities (IPS)

FIGURE 1

APPENDIX VI

PAGE CREATION SERVICES

The following companies provide commercial Telidon page creation services:

DOMINION DIRECTORY CO. LTD.
Burnaby, British Columbia.

HEMTON CORPORATION
Ottawa, Ontario.

INFOMART
Toronto, Ontario.
Ottawa, Ontario.
Calgary, Alberta.
Winnipeg, Manitoba.